Endoscopic Treatment of Hypopharyngeal Diverticula

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IT IS WELL RECOGNIZED that hypopharyngeal pulsion diverticula can be repaired by the external surgical approach. Endoscopic operation is the only other effective treatment. In spite of technical improvements with reduced complications in the one-stage diverticulectomy, with dissection and extirpation of the sac, it is still a long and radical operation. This is an important consideration in dealing with elderly, debilitated patients, as most of them are. Hence the speed and ease with which the endoscopic procedure can be accomplished makes it the treatment of choice for patients who are poor risks.

Pathogenesis of Diverticula

Development of hypopharyngeal diverticula (Figure 1) produces a bulge or herniation of mucosa through the weakened posterior midline of the inferior constrictor muscles above the cricopharyngeus muscle (stopcock).

An easily understood and visualized concept of the pathogenesis is that the bolus of food is pushed down the pharynx as the constrictor muscle is actively contracting in the normal process of deglutition. There is then failure of normal synchronous relaxation of the cricopharyngeus muscle in the cephalad end of the diverticular-esophageal party wall. This wall creates a plowshare effect, directing the food into the sac rather than into the esophagus. This sustained contraction, narrowing the normal lumen of the esophagus, tends to widen the opening of the developing diverticulum (Figure 1, B). Then as the diverticular pouch enlarges and pulls downward, the resulting torsion pull on the esophagus has a kinking effect which causes a direct dropping flow of material into the diverticular sac as the narrowed esophageal lumen migrates forward and upward. Obviously, the more this process progresses, with enlargement of the sac, the more difficult it becomes for food to pass into the normal passages (Figure 2).

The sac is the product of the pathologic change, not the cause. On the contrary, the causative factor, the cricopharyngeal ring and the party wall divert the normal stream of food from the pharynx into the developing sac. Removal of the party wall, including the cricopharyngeus, would relieve both the cause of the pathologic state and the symptoms, without removing the sac.

Treatment

With the external surgical approach (diverticulectomy), the surgeon always must accept the risk of removing too much tissue (sac and esophageal wall), with the attendant complication of stricture, or incomplete removal and the possibility of recurrence. It has been observed that even when too little of the sac is removed and residual small sacculation is left, if the cricopharyngeus muscle had been resected at the time of delivery of the sac and its neck—that is, if the cricopharyngeus had been resected (Figure 3)—the patient would experience no symptoms despite postoperative dimpling or sacculation. As long as the cricopharyngeus is present and active, symptoms should be expected to recur (Figure 4).

In 1906 Mosher attempted to correct pulsion diverticula endoscopically by splitting the party wall with scissors. Mediastinitis developed in the

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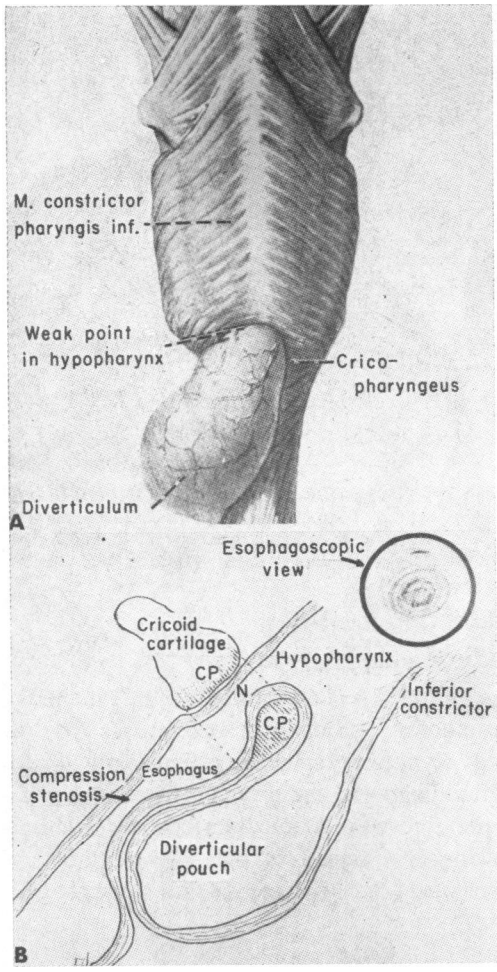

Figure 1.—A. Hypopharyngeal diverticulum is a mucosal bulging through weakened posterior midline of inferior constrictor muscle, above the cricopharyngeus. B. Diagram demonstrates how contraction of cricopharyngeus (C.P.) narrows normal lumen (N) while opening diverticular pouch. Insert shows narrowed lumen above the widened pouch orifice.

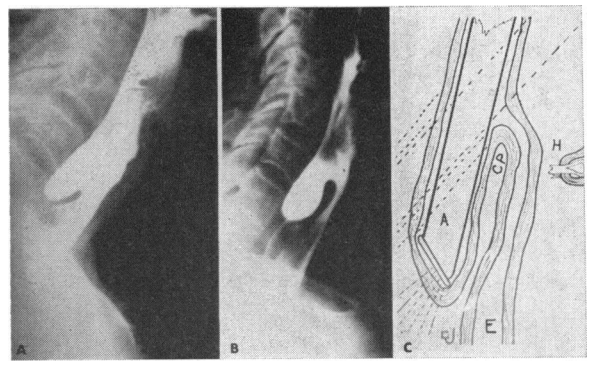

Figure 2.—Pathogenesis—As diverticulum enlarges, it pulls downward with a torsion pull kinking the esophagus, causing upward migration of the neck and narrowing the esophageal lumen (A to B). With enlargement of sac (C) there is a direct dropping flow into sac, material entering esophageal lumen only after sac is filled. (A. Esophagoscope passing directly into diverticular sac. E. Esophageal Lumen. C.P. Cricopharyngeus.)

second patient he operated upon in this way, and he made no further attempts.

Dohlman[1] in 1958 reviewed 100 cases in which he had used an operative technique that he had developed during the preceding 20 years. It is this technique, as further developed and described by Holinger,[2] that is being presented herein.

Technique in Endoscopic Repair

The armamentarium (Figure 5) consists of a double beaked esophagopharyngeal speculum which is used as a ground for the diathermy, a coagulating alligator forcep, an endoscopic diathermy knife and an endoscopic spatula guard. Endotracheal anesthesia is used.

With the beaks of the endoscope straddling the

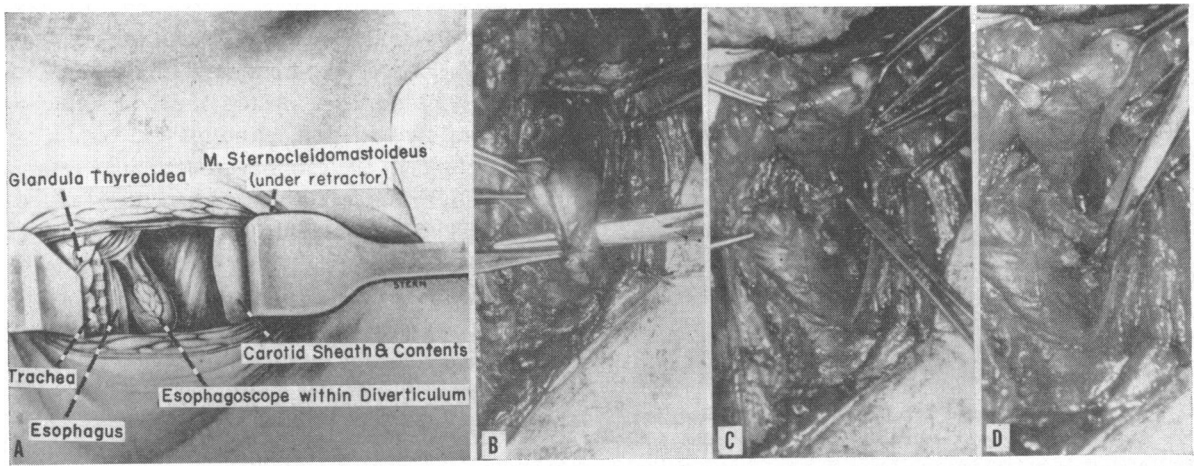

Figure 3.—External Diverticulectomy. A. Operative field sketch; B. Diverticulum delivered; C. Elevation of sac reveals neck of sac riding over cricopharyngeus muscle; D. Cricopharyngeus muscle being sectioned with scissors. ***(Section of cricopharyngeus is key to successful cure of diverticulum whatever approach is used.)***

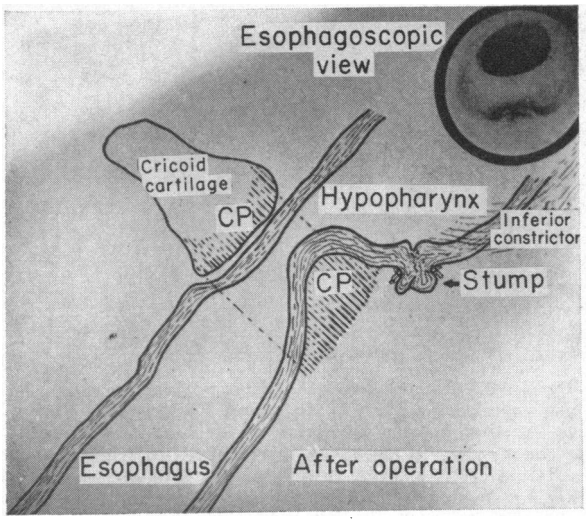

Figure 4.—Sketch demonstrates postoperative status excision of diverticulum with failure of removal of cricopharyngeus (C.P.) favoring recurrence of pathology.

party wall, one beak is inserted into the patulous sac orifice (Figure 6, A) and the other into the narrowed esophageal lumen. The diathermic coagulating alligator forceps is used to coagulate the midline of the party wall, after which the party wall is incised with the diathermy knife. The posterior wall of the sac is protected with the endoscopic spatula guard. Although the outline of the sac remains, the contents of the open walled sac empty into the esophagus, the retaining wall having been removed (Figure 6, B).

The procedure is accomplished in a few minutes.

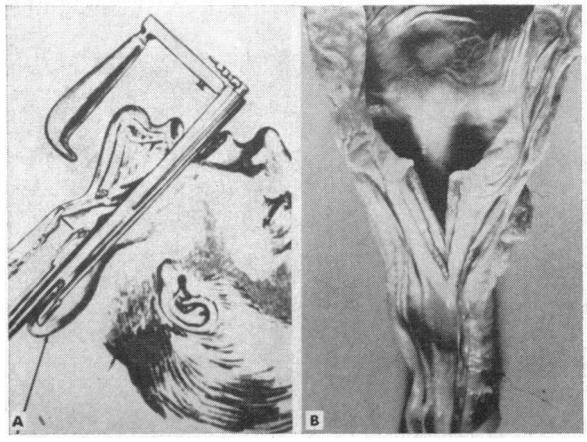

Figure 6.—Technique A.—Dohlman endoscope in place with long beak of scope extending into esophagus and short beak into diverticulum. B. Specimen upper esophagus with diverticulum. Diverticular esophagus party wall has been split, with gaping opening of sac emptying into esophageal lumen (cadaver demonstration).

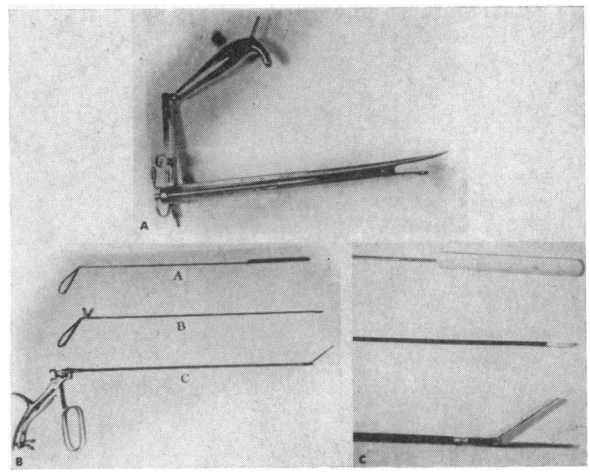

Figure 5.—Armamentarium consists of a double beaked esophagopharyngeal speculum (A), and diathermy instruments. A, endoscopic spatula guard; B, endoscopic diathermy knife; and C, coagulating alligator forceps.

Presentation Features

Cinefluoroesophagram

The author has successfully treated nine patients in the manner. Cinefluoroesophagrams were used to study hypopharyngeal diverticula and to document the diagnosis, the preoperative status and the postoperative results as described by Dohlman.[1] Following is a report of one representative case with selected frames of the cinefluoroesophagrams.

Report of a Case

The patient was a 66-year-old man with a history of increasing difficulty in swallowing, regurgitation, noisy gurgling on swallowing, recurrent aspiration of overflow of the pouch, and pneumonia.

Fluoroscopic esophagram examination revealed a massive hypopharyngeal diverticulum (Figure 7 A and B). Endoscopic treatment gave immediate relief of symptoms. A postoperative cinefluoroesophagram showed that, although the outline of the sac remained, the esophagodiverticular retaining wall with the cricopharyngeus had been incised, allowing the bolus contents to flow freely out of the sac and in a normal manner into the esophagus (Figure 7 C, D and E). The bulk of the bolus passed freely into the esophagus on swallowing, only an insignificant amount of material being retained after 5 minutes, and less still after 15 minutes (Figure 7 F and G).

Comment

Although Zenker's diverticula are occasionally

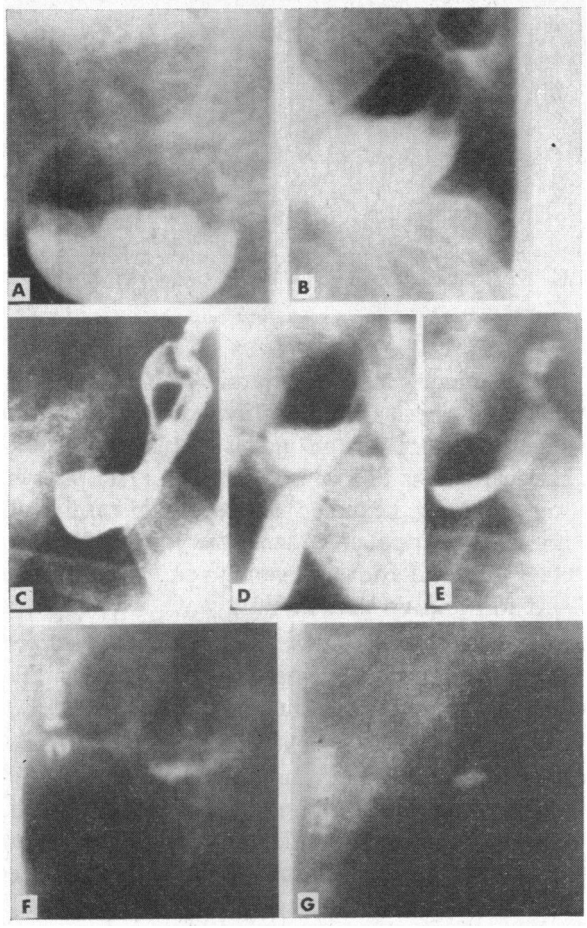

Figure 7.—Cinefluoroesophagram of reported case demonstrating: Figures 7-A, 7-B—AP and lateral views of hypopharyngeal pulsion diverticulum with massive retention, only overflow of the sac passes into esophagus. Figures 7-C, 7-D, 7-E—Appearance after resection of diverticular esophageal party wall, demonstrates unimpeded flow of bolus out of sac into esophagus. The insignificant residual is demonstrated in five and fifteen minute films. Figures 7-F, 7-G.

Photos all taken under identical enlarging distance factors of fluoroscopic tube, and development of illustrations; the variance in size of the lesion representing valid comparisons.

seen in patients in their fifth decade of life, almost all cases of pulsion diverticulum are in patients in their sixties or seventies. Age may be a factor in the development of the diverticulum; weakening of the inferior constrictor muscle as well as the dyskenesis between the contraction of the inferior constrictor and the failure of relaxation of the cricopharyngeus muscle may be part of the aging process. Inability to eat enough without distress may bring about hypoproteinemia. This, added to the debility and the often present pulmonocardiovascular infirmities consistent with their age, may make these patients serious anesthetic and surgical risks for any more than the simplest and shortest of procedures. The rapidity and ease by which endoscopic resection of diverticula is accomplished makes it ideal in such circumstances.

It is not intended, however, to replace the highly successful one-stage surgical procedure unless there are factors contraindicating this more extensive procedure. The incidence of recurrence of diverticulum after endoscopic repair has been reported as high as 7 percent, compared with at least 3 percent after the external approach.[1] Because of scar tissue and adhesions, reoperation externally for correction of recurrence after such a procedure is extremely hazardous, whereas reoperation after failure of the non-scarring endoscopic method can be easily accomplished. Moreover, the endoscopic procedure can be used without difficulty in cases of recurrence following either approach.

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2. Holinger, P. H., and Johnson, K. C.: Endoscopic surgery of Zenker's diverticula, Ann. Otol. Rhino. Laryng., 70:117-1123, 1961.